

and hail storm visited the region about York, Pa., in the afternoon. During a thunderstorm in the afternoon damage was caused by wind at Weldon, N. C. Near Bement, Ohio, gardens were damaged by a hailstorm. A severe storm visited the region about Clark, S. Dak. Four buildings were struck and some stock was killed by lightning, and a house was blown down, injuring two persons. Large tracts of timber northwest of Texarkana, Tex., were leveled by a storm at night. A thunder and hail storm occurred about Abilene, Tex., in the morning; the temperature fell from 89° to 56°.

Destructive tornadoes occurred in the evening in south-central Kansas. The storm apparently moved eastward, traversing the distance between Attica and Kellogg, Kans., about 65 miles, in 3 hours, giving an average rate of advance of about 22 miles per hour. Two funnel-shaped clouds were observed 1 mile north of Medicine Lodge, Kans., and two formed 2½ miles northwest of that place. The first two traveled in an easterly direction, and the others are reported as having moved westerly. The storm was attended by hail and was very destructive north of Medicine Lodge. At Attica, Kans., a thunder and hail storm moved east at 6.30 p. m. At Harper all houses were reported destroyed or damaged; no fatalities in Harper, but 3 persons reported killed near that place. At Argonia a heavy wind, rain, hail, and thunder storm moved south of east at 8 p. m.

At Wellington a tornado occurred at 9.30 p. m. The storm moved north of east in a path about 200 yards in width, its arrival being preceded by heavy rain. Its passage was attended by a continuous roar of thunder and an incessant blaze of lightning. The greatest destruction was observed in the southern part of the path, and articles were thrown from south to north; 12 persons were killed, and the destruction to property was estimated at \$200,000. Two clouds were observed, one traveling from the northwest and one from the southwest. After the union a dark mass of cloud hung down and traveled with great velocity, attended by a roaring sound. When the cloud touched the ground it appeared like a mass of fire. A dead calm preceded the breaking of the storm over Wellington; the air apparently became rarefied, and breathing was difficult; the color of the lightning flashes changed from white to an intense blue; a roar was next heard, which grew louder as the storm approached. The storm struck timber 2 miles south of Kellogg, which is about 20 miles east of Wellington, and caused damage to orchards, buildings, etc., in that section. On the north side of the track the debris was thrown west, and on the south side it was thrown east. Hailstorms were reported near Dodge City, Kans., in the afternoon.

28th.—Thunderstorms occurred in New Jersey, Florida, Illinois, Missouri, and Wisconsin. During a heavy thunderstorm in the evening 2 houses in New Brunswick, N. J., were struck by lightning. Destructive thunderstorms, attended in instances by hail and violent winds, occurred in various parts of Florida. A tornado moving northeast was reported south of Olney, Ill., at 4.03 p. m. The storm had a whirling motion and the path of destruction varied from 50 to 200 yards in width. Trees in the center were broken off and appeared scorched by fire; those on the edges of the path were thrown toward the center. The damage to buildings was estimated at \$4,500, and to orchards \$2,000. Near Decatur,

Ill., a man was killed by lightning. A destructive storm moving northeast was reported near Fulton, Mo. Destructive local storms occurred at Warrenton and Marshall, Mo. At Columbia, Mo., 0.76 inch of rain fell in 10 minutes, commencing 4.40 p. m., and high wind damaged outbuildings, etc. At Lancaster, Wis., 2 persons were stunned by lightning. Destructive wind and hail storms were reported in east-central Texas.

29th.—Heavy hailstorms occurred in western Florida, southern Alabama, Tennessee, Kentucky, Missouri, and Oklahoma, and destructive local storms were reported in Kansas. At Flomaton, Ala., hail damaged vegetation. A wind and hail storm caused damage to cotton and corn about Jackson, Tenn. Buildings were twisted and trees were uprooted at Earlington, Ky., by a windstorm which was attended by heavy rain and hail. Destructive thunder and hail storms occurred at Carrollton, Mo., and Buffalo, Okla. At Columbus, Kans., a barn was struck and some stock was killed by lightning. Hail damaged wheat near Arkalon, Kans. Severe storms were reported in extreme south-central Kansas.

30th.—Local storms occurred in Virginia, South Carolina, Tennessee, Illinois, Missouri, Kansas, and Oklahoma. At Norfolk, Va., a man was killed by lightning. Several trees were struck by lightning at Charleston, S. C. A cloudburst occurred at Lynnvile, Tenn., and a large area was flooded. A heavy thunderstorm occurred at night at Olney, Ill. A destructive storm visited McLeansborough, Ill.; the storm advanced from the southwest; one house and two barns were destroyed. A heavy thunderstorm visited Platte River, Conception, and Springfield, Mo. A thunderstorm, with heavy hail and excessive rain, occurred at Dodge City, Kans., in the afternoon. 0.47 inch of rain fell in 5 minutes. A tornado destructive to life and property was reported near Independence, Kans., in the evening. A destructive hailstorm occurred at Shields, Kans. A heavy thunder and hail storm occurred at night at Gate City, Okla.

31st.—Severe storms occurred in Michigan, Ohio, Indiana, Mississippi, Arkansas, Louisiana, and Texas. A thunderstorm, with high westerly winds, occurred in the afternoon at Detroit, Mich. Damage by wind, hail, and lightning was reported in various parts of the state. Lightning struck in several places in Toledo, Ohio. Heavy rain caused washouts on railroads in Indiana. In the early morning houses in Fort Smith, Ark., were unroofed by wind. Severe windstorms were reported at Liberty Hill and Coushatta, La. Destructive local storms occurred in east-central and north-central Texas. At San Angelo, a tornado moved southeast in a path 400 to 500 yards in width at 5.30 p. m., with hail and some thunder and lightning. One person was fatally injured. Debris in the path was thrown southeast. On the southwest side of the path buildings were turned and faced southwest. At Belcherville a heavy rain, thunder, and hail storm moved southeast at 4.20 p. m. Damage was confined to the south side of the storm's path; 40 to 50 buildings were destroyed, and several persons were injured. Very heavy rain fell at Forestburgh, Tex. A heavy thunderstorm from the northwest visited Palestine at night. Hail was reported southwest of that place. Near Durango a tornado moved northeast in a path about 400 yards in width at 6.30 p. m., with heavy rain, thunder, and vivid lightning. Six persons were reported killed.

INLAND NAVIGATION.

FLOODS.

The month opened with rivers above the danger-line at Paducah, Ky., Cairo, Ill., Memphis, Tenn., Vicksburg, Miss., and New Orleans, La. Heavy rains had flooded streams in eastern Kansas, northwestern Missouri, Iowa, Illinois, and Indiana. The crevasse at La Blanches on the Lafourche Bayou was reported as widening; a large body of water was escap-

ing through the break, and many plantations were being submerged. On the 2d the Ohio River fell below the danger-line at Paducah, Ky. The Mississippi River was rising slowly at Memphis and Vicksburg. During the 5th and 6th the Kansas River rose rapidly, flooding parts of the suburbs of Kansas City. On the 6th the Mississippi River rose above the danger-line at Keokuk, Iowa. On the 7th the Mississippi River was

rising rapidly at Hannibal, Mo. At New Orleans the river was rising slowly and stood at 16.5 feet. The Ohio River fell below the danger-line at Cairo, Ill. Bottom lands along the Des Moines River were under water, and great damage was caused by flooding streams in Illinois and Indiana.

On the 8th heavy rain flooded streams in eastern Kansas and western Missouri. Great devastation by flood was reported along the Illinois River. Flooding streams caused great damage about Lincoln, Nebr. The flood in the Des Moines River was slowly subsiding. The Maumee River was very high at Toledo, Ohio. On the 9th the Republican River overflowed its banks, causing considerable damage in low lands about Concordia, Kans. The Missouri River was rising at Kansas City. Streams continued to rise in northern Missouri, and flood conditions continued along the Illinois River. The Des Moines and Raccoon rivers were overflowing low lands in the region about Des Moines, Iowa. The Mississippi River fell slightly from Hannibal, Mo., northward. The river was rising at Saint Louis, and reached the danger-line at Louisiana, Mo. The levee on the Arkansas side of the Mississippi River in Kentucky Bend, 26 miles south of Greenville, Miss., broke, the crevasse being 350 feet in width; efforts to stop the break were futile.

On the 11th the Missouri River was rising steadily at Kansas City, Mo., and was 1.1 foot below the danger-line. In the evening the river reached 29.6 feet at Saint Louis, Mo., the highest stage since 1883. On the 12th the Mississippi River fell below the danger-line at Keokuk, Iowa, in the early morning. The river continued to rise at Saint Louis, reaching 30.6 feet. The Missouri River passed the danger-line at Kansas City at 11 p. m. On the 13th a break was reported in the levee at Panther Forest, below Arkansas City, Ark. The Mississippi River fell below the danger-line at Memphis, Tenn.

The Arkansas River was rising rapidly at Fort Smith, Ark. At Little Rock the river reached a stage of 22 feet, 1 foot below the danger-line. At Kansas City, Mo., the river had risen 1.3 foot in 24 hours, and considerable damage was caused by flood in the suburbs Armourdale and Argentine.

On the 14th the Mississippi was rising at Saint Louis, and the water passed the danger-line, 32 feet, between midnight and 6 a. m., inundating the river front and north and south parts of the city. At Kansas City, Mo., the river reached 22.6 feet in the morning, flooding Harlem. The Electric Light and Smelting Works in Argentine suspended operations, being surrounded by water. About 100 houses in Armourdale, and 150 houses in Argentine were vacated. The Arkansas and Red rivers were rising rapidly. On the 15th the river reached 34.4 feet at Saint Louis. Railroad traffic was badly crippled, nearly all tracks entering the city being submerged, and a part of the American Bottom, in Illinois, was inundated, owing to a break in the Madison levee. The Missouri river reached 23.2 feet at Kansas City, causing great damage to property. At Leavenworth, Kans., the river was reported stationary. The Arkansas River reached 27 feet at Fort Smith, Ark., in the morning, a rise of 10.2 feet in 24 hours, and by 8 p. m. had reached 29 feet. At Little Rock the river began to rise at noon, and reached 22.5 feet by 8 p. m.

On the 16th the Mississippi River continued to rise at Saint Louis. At Davenport, Iowa, it was stationary. About 2 a. m. a break occurred in the levee at or near Bonnet Carre, on the east bank of the Mississippi 25 miles north of New Orleans. The crevasse was reported 150 feet in width. Plantations in the vicinity of the break were submerged, and trains on the Mississippi Valley Railroad were delayed. The Missouri River was falling slowly at Leavenworth, Kans. The Arkansas River reached 30.2 feet at Fort Smith, Ark., causing great damage to crops by flooding of bottom lands. About 4,500 acres of cultivated land about Fort Smith were submerged. At Little Rock the river rose to 25 feet, 2 feet above the danger line, flooding large areas above and below the city. The Ohio River was above the danger-line at Cairo, Ill. The lower part of

Beardstown, Ill., and many farms in that section were flooded by the Illinois River.

On the 17th the break at Bonnet Carre, La., had widened to 250 feet and was 12 feet deep. At Saint Louis, Mo., the stage of water was 35.3 feet, a rise of 5 feet in 5 days. At Cairo, Ill., the stage was 41.8 feet, a rise of 5.3 feet in 7 days. Destructive floods were reported along the Red River in Texas and Louisiana. The Arkansas River continued to rise, reaching 26 feet at Little Rock at 6 p. m. The Missouri River was falling slowly at Kansas City.

Excessive rain caused a disastrous flood in the Floyd Valley, Iowa, on the 18th. Rains had saturated the ground and streams were running bank full. Heavy rain began the evening of the 16th and continued at intervals until the night of the 17th. The flood extended as far as Alton, 40 miles above Sioux City. At Le Mars the water was highest at 3 a. m., 18th, when it flooded the entire valley to a depth of 4 to 6 feet. The breaking of the dam at that place is reported to have had no effect upon the flood, as, at the time it broke, the water was as high below as above the dam. The Floyd Valley has an average width of three-fourths mile. At its usual stage the river is about 50 feet in width, with 5 to 6 feet of water in the channel. The water reached Lynn and Leeds, suburbs about 4 miles above Sioux City, at 6.30 a. m., 18th, and came in a wave 4 feet in height. The places named have a population of about 2,500, about one-third of which number lost all of their household effects by flooding of houses. The water reached Sioux City 7 a. m., and at 9 a. m. was 3 to 10 feet deep on the flats. It continued to rise until 12.30 p. m., when it began to subside. The flood resulted in the loss of at least 20 lives. 1,000 families were rendered homeless; 3,000 persons were reported destitute; 167 buildings were swept away; and 700 were rendered untenable. The aggregate damage to property was placed at \$1,000,000. This flood was thought to be no higher than those of 1876 and 1881, but more damage was caused, owing to the greater number of buildings exposed.

The Mississippi River continued to rise at Saint Louis. A large number of plantations about the Bonnet Carre crevasse were reported under water. The Missouri River was rising at Kansas City, flooding bottoms and suburbs. The Arkansas River rose to 27 feet at Little Rock at 6 p. m., flooding plantations above and below that place. The Des Moines and Raccoon rivers flooded low lands along their banks. On the 19th the Mississippi River reached 36 feet at Saint Louis. 60,000 acres of bottom land in Illinois opposite Saint Louis were submerged and crops ruined. The Ohio and Mississippi Railroad was the only road running trains east, the sweeping away of the Madison levee having inundated all others. The Missouri River rose 1.5 foot at Kansas City and a great deal of property about that place was under water. The Arkansas River reached 30.9 feet at Fort Smith, the highest point ever noted at that place, the highest previous stage being 29.9 in 1844. 10,000 acres of cultivated land were submerged in that section, causing a loss estimated at \$200,000. The Red River rose rapidly at Shreveport, La. Smaller streams in Illinois were high and flooding their banks.

On the 20th the Mississippi River was falling slowly at Saint Louis. The Missouri River continued to rise at Leavenworth, Kans., reaching a point one-tenth foot below the danger-line. The Arkansas River fell slowly at Fort Smith. At Little Rock the river reached its highest stage, 27.9 feet, the highest stage noted at that place since 1844. The Red River reached 29.3 feet at Shreveport, La. Levees at Carolina Bluff, 25 miles above Shreveport, and on the opposite side of the river in Caddo parish were reported broken and much valuable land flooded. At Des Moines, Iowa, the rivers were higher than at any time since 1851, and great damage was caused in the bottoms. On the 21st the Mississippi River was falling at Saint Louis. The Missouri River was rising and nearly 4 feet above the danger-line at Kansas City. All low lands were under water, and Harlem and parts of Armourdale and Argentine

were nearly depopulated. In the evening the river was falling slowly at Kansas City. At Little Rock the Arkansas River began to fall slowly, reaching 27.6 feet at 5 p. m. At Shreveport the Red River rose 1.3 foot in 24 hours. The Des Moines River flooded the lower part of Ottumwa, Iowa. At Des Moines the river was falling slowly.

On the 22d a serious break in the levee occurred in Saint Johns parish, 46 miles north of New Orleans on the east bank of the Mississippi River, and water covered the tracks of the Mississippi Valley Railroad for a distance of one mile. The Red River rose 1.4 foot at Shreveport, and breaks in the levees occurred at Navigation and Youngs Points and at Nicholas Place, submerging many fine plantations. The Missouri River was falling at Kansas City. Floods were reported along the Hudson River and in interior streams of New York. On the 23d the Mississippi River reached 17.1 feet at New Orleans, La., equaling the highest stage on record. Two crevasses were reported in the Red River below Shreveport, La., causing the overflow of bottom lands in the vicinity of Loggy Bayou. On the 24th the Mississippi River rose above the danger-line at Memphis, Tenn. The river was stationary at 48.2 feet at Vicksburg, and maintained a stage at 17.1 feet at New Orleans. The Arkansas River fell below the danger-line at Fort Smith, Ark. The levee on the Herdon Place in Caddo parish on the Red River broke.

On the 25th the Willamette River rose rapidly at Portland, Oregon, covering the lower docks. On the 26th the Missouri River fell below the danger-line at Kansas City, Mo. Breaks were reported in the levees of the Red River as follows: a large break in Thompsons levee at Wild Lucia; 6 breaks at Woods Place 40 to 200 feet in width; 1 break at Hati 250 feet in width; a break at Kansas 40 feet in width; and 2 breaks at Soda Fount 200 to 300 feet in width. Nearly all lands in Bossier parish were reported under water, except from Benton to Shreveport. Low lands on the Saint Francis and White rivers in Arkansas were flooded. On the 27th a large break occurred in the Red River levee at Gold Point. On the 28th the Mississippi River fell to the danger-line at Keokuk, Iowa. A crevasse occurred at the Story Plantation, 9 miles below New Orleans on the east bank of the river. The Red River reached 35.6 feet at Shreveport. At Little Rock the Arkansas River fell below the danger-line.

On the 29th the Mississippi River was below the danger-line at Keokuk, Iowa. The Red River was falling at Shreveport, La. On the 30th the Red River fell 0.4 foot at Shreveport. Ninety per cent. of the cultivated land about Gaines Landing, Chicot county, Ark., was reported overflowed. At the close of the month the Mississippi River had risen above the danger-line at Dubuque, Iowa, flooding houses in low-lying parts of the city. At Saint Louis the stage was 31.9 feet, 1.9 foot above the danger-line, and the river was falling slowly. At Memphis the river was rising and 1.2 foot above the danger-line. At Vicksburg the river was about stationary at 48.3 feet, 1.3 foot above the danger-line. At New Orleans, La., there was a 17-foot stage, and the river was rising slowly. At New Orleans the levees were holding good. Bottom lands were submerged along the Black River in Missouri. The Willamette River was over the lower docks at Portland, Oregon.

OPENING OF NAVIGATION.

The Erie Canal was opened for navigation at Rochester, N. Y., on the 1st.

Heavy floating ice was reported at Sault de Ste. Marie, Mich., on the 1st.

The first up river steamer of the season arrived at Pierre, S. Dak., on the 5th.

On the 8th the harbor at Duluth, Minn., was filled with ice, making navigation difficult.

The Straits of Macinac were open on the 6th. On the 10th a steamer passed through bound for Buffalo, N. Y.

The first arrival of the season was noted at Cheboygan, Mich., on the 12th.

Records kept at the port of Cheboygan, Mich., show that the opening of the straits for navigation this season was the earliest since 1855.

STAGE OF WATER IN RIVERS.

In the following table are shown the danger-points at the various river stations; the highest and lowest stages for the month, with the dates of occurrence, and the monthly ranges:

Heights of rivers above low-water mark, May, 1892 (in feet and tenths).

Stations.	Danger-point on gauge.	Highest water.		Lowest water.		Monthly range.
		Date.	Height.	Date.	Height.	
<i>Red River.</i>						
Shreveport, La	29.9	28	35.7	3	18.9	16.8
<i>Arkansas River.</i>						
Fort Smith, Ark	22.0	19	31.0	5	6.1	24.9
Little Rock, Ark	23.0	20	27.9	7	9.4	18.5
<i>Missouri River.</i>						
Fort Buford, N. Dak		31	11.7	4	6.1	5.6
Bismarck, N. Dak		31	6.1	6-9, 23-25	2.8	3.3
Pierre, S. Dak	14.0	13	3.0	31	1.4	1.6
Sioux City, Iowa	18.7	19	11.2	4.5	7.8	3.4
Omaha, Nebr	18.0	23	13.1	4.5	8.4	4.7
Kansas City, Mo	21.0	21	24.9	2	12.4	12.5
<i>Mississippi River.</i>						
Saint Paul, Minn	14.0	26	12.6	1	4.1	8.5
La Crosse, Wis	11.8	27, 29	11.6	1	3.8	7.8
Dubuque, Iowa	16.0	31	16.2	1	5.8	10.4
Davenport, Iowa	15.0	31	11.8	1	4.5	7.3
Keokuk, Iowa	14.0	7	15.6	1	6.0	9.6
Hannibal, Mo	17.0	9	18.5	1	7.8	10.7
Saint Louis, Mo	30.0	19	36.0	4	20.2	15.8
Cairo, Ill	40.0	1	47.4	10	36.5	10.9
Memphis, Tenn	33.0	2, 4	34.6	16	31.2	3.4
Vicksburg, Miss	41.0	10, 11, 14-16, 18.	48.4	1	47.4	1.0
<i>Ohio River.</i>						
New Orleans, La	13.0	23, 24	17.1	1, 2	16.1	1.0
<i>Parkersburg, W. Va.</i>						
Parkersburg, W. Va	38.0	19	19.0	3	7.0	12.0
Cincinnati, Ohio	45.0	21, 22	32.2	6	17.2	15.0
Louisville, Ky	24.0	21	12.4	7	8.6	3.8
<i>Cumberland River.</i>						
Nashville, Tenn	40.0	1	22.7	18	6.8	15.9
<i>Tennessee River.</i>						
Chattanooga, Tenn	33.0	1	8.7	18	4.8	3.9
<i>Monongahela River.</i>						
Pittsburg, Pa	29.0	5, 29	12.2	2	3.6	8.6
<i>Savannah River.</i>						
Augusta, Ga	32.0	13	9.8	30, 31	7.0	2.8
<i>Willamette River.</i>						
Portland, Oregon	15.0	31	17.7	8	5.4	12.3
<i>Susquehanna River.</i>						
Harrisburg, Pa	17.0	23, 24	8.8	2, 3, 4	2.8	6.0
<i>Alabama River.</i>						
Montgomery, Ala	48.0	2	6.9	29, 30	3.8	3.1

ATMOSPHERIC ELECTRICITY.

THUNDERSTORMS.

Description of the more severe thunderstorms reported for the month is given under "Local storms."

Thunderstorms were reported as follows: East of the Rocky Mountains they were reported in the greatest number of states, 32, on the 26th and 27th; in 27 on the 15th; in 26 on the 18th; in 20 to 25 on the 2d, 4th, 6th, 9th, 10th, 14th, 16th, 17th, 25th, and 28th to 31st; in 15 to 19 on the 1st, 3d, 5th, 7th, 8th, 11th, 12th, 13th, 19th, 20th, 21st, and 24th; and

in 10 to 14 on the 22d and 23d. There was no date for which thunderstorms were not reported in less than 10 states east of the Rocky Mountains.

East of the Rocky Mountains thunderstorms were reported on the greatest number of dates, 29, in Illinois; on 28 in Kansas and Missouri; on 26 in Texas; on 20 to 25 in Arkansas, Florida, Indiana, Iowa, Kentucky, Nebraska, North Carolina, Ohio, Oklahoma, South Dakota, and Tennessee; on 15 to 19 in Alabama, Georgia, Louisiana, Maryland, Michigan, Mississippi,